REMARKS

I. INTRODUCTION

In response to the Office Action dated May 12, 2005, Claims 1 and 16 have been amended. Claims 1-30 remain in the application. Entry of this response, and reconsideration of the application in light of this response, are respectfully requested.

II. NON-ART BASED REJECTIONS

On page 2 of the Office Action, claims 1-30 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention.

The Applicants respectfully traverse the rejection, however, the Applicants thank the Examiner for providing the dictionary definition of "spacecraft" and accept the Examiner's definition as provided. Applicants believe that this renders the rejection moot, and respectfully request that the rejection be withdrawn.

III. PRIOR ART REJECTIONS

On page (2) of the Office Action, claims 1, 3-6, 8-16, 18-21, and 23-30 were rejected under 35 U.S.C. §102(b) as being anticipated by Duchon, U.S. Patent No. 5,761,031; on page (3) of the Office Action, claims 1-2, 8, 10-13, 16-17, 23 and 25-28 were rejected under 35 U.S.C. §102(b) as being anticipated by Storaasli, U.S. Patent No. 5,597,141; on page (4) of the Office Action, claims 1-2, 6-17, and 21-30 were rejected under 35 U.S.C. §102(b) as being anticipated by Clarke, U.S. Patent No. 3,151,704; and on page (5) of the Office Action, claims 1 and 16 were rejected under 35 U.S.C. §102(b) as being non-patent literature described on Houston Chronicle's Space Chronicle. Applicants respectfully traverse these rejections in light of the arguments below.

The Duchon Reference

The Duchon reference discloses an artificial satellite equipped with aerodynamic orientation rudders. Duchon merely describes an artificial satellite equipped with roll, yaw and pitch rudders (4, 4', 5) to impose on the satellite rotational forces around its three axes due to the resistance of the

rarefied air which surrounds the satellite (compensation for the dynamic inertia of rotating objects onboard the satellite can also be ensured). See Abstract.

The rotation of the rudders 5 and 5', and more specifically the one located in the front of the satellite, produces a dissymetrical obstacle to the flow of rarefied air surrounding the satellite and thus a force around the transverse axis Ys of sufficient intensity at altitudes of some hundreds of kilometers to make the desired pitch corrections rather quickly. The shocks are less than with thrusters and even inertia wheels, so that more gradual, better controlled changes are made. See Col. 3, lines 26-34.

FIGS. 10A and 10B show a third possible embodiment for the pitch rudders 5" which then consist of a sheet-metal strip 50 held like a tent between two rollers 51 adjacent to the central body 1, located parallel to the transverse axis Ys. They rotate around axes 52 near the upper and lower edges of the front or rear side of the central body 1, but torsion springs, not shown, are located between the rollers 51 and the axes 52 to help wind the sheet metal strip 50 around the rollers 51, which a telescopic arm 53 allows when it is folded. The telescopic arm 53 is composed of two lines of rods jointed between them and in their centers in order to draw rhombi. A system that can be composed of an endless screw turning some toothed sectors integral with the rods on the ends of the two lines – like automobile jacks – make the telescopic arm 53 straighten or retract and carry to the opposite end of the central body 1 a yardarm 54 parallel to the rollers 51 which pulls and unwinds the sheet-metal strip 50 when it is moved away from them. See Col. 4, lines 19-36.

The Storaasli Reference

The Storaasli reference discloses a dynamic balance mechanism for balance control of a gyro stabilized (spinning) satellite. An elongated gear rack is attached to the spacecraft. A movable mass is mounted by guide rollers on the gear rack and translates along the gear rack according to requisite electronic commands. The movable mass includes a housing, a stepper motor, a rotary potentiometer, a cable reel, a pair of gear heads and a pinion gear. The pinion gear meshes with the rack and is driven by the stepper motor. The potentiometer measures the position of the movable mass on the gear rack. The cable reel saves space and minimizes harness jamming conditions. The invention secures better weight efficiency. See Abstract.

A flexible wire or cable 64 supplies electrical power to the stepper motor and potentiometer in order to drive the pinion gear. The cable 64 is preferably an 8-wire flexible cable and plugs into a terminal strip or the like on the satellite adjacent one end of the gear rack 30. See Col. 4, lines 23-27.

The Clarke Reference

The Clarke reference discloses a spring motor. The spring motor includes a second spring means for increasing the starting torque and/or the length of run. This spring means may take the form of a power spring of various types, such as a conventional power spiral spring, a torsion spring, or other suitable spring means. See Col. 2, lines 32-37.

The Houston Chronicle Reference

The Houston Chronicle reference discloses a solid-state recorder. The new solid-state recorder is about the same size as the reel-to-reel it replaces.

The Claims are Patentable Over the Cited References

Independent claims 1 and 16 are generally directed to an apparatus for trimming the mass properties of a spacecraft. An apparatus in accordance with the present invention comprises a storage spool rotatably mounted on a first shaft, the first shaft being mounted on the spacecraft on a first side of a center of gravity of the apparatus, an output spool rotatably mounted on a second shaft, the second shaft being mounted on the spacecraft on a second side of the center of gravity of the apparatus such that the first shaft, the center of gravity, and the second shaft are substantially colinear along a first line, and a flexible material having a first end coupled to the storage spool and a second end coupled to the output spool, the flexible material traversing a second line, the second line being substantially perpendicular to the first line, wherein a length of the flexible material is distributed between windings of the storage spool and the output spool to adjust mass properties of the spacecraft by changing the center of gravity of the apparatus.

None of the cited references teach nor suggest these various elements of Applicants' independent claims.

In the Duchon reference, the sheet-metal strip 50 is deployed to provide an obstacle to the flow of rarefied air surrounding the satellite. The sheet metal strip 50 is used as a rudder. The

sheet-metal strip is not distributed to adjust the mass properties; it is deployed or distributed to provide air resistance. Further, the rollers 51 are not colinear with the center of gravity shown in FIG. 10B. Since the arrangement and teachings of Duchon are not consistent with the claims, Duchon does not teach the limitations of independent claims 1 and 16.

In the Storaasli reference, the cable 64 provides power to the stepper motor, but since the stepper motor moves with the movable mass mechanism 14, the cable 64 must be deployed and retracted with the stepper motor. The cable is not distributed to adjust the mass properties of the spacecraft; the cable is unwound to provide power to the movable mass mechanism 14. Further, the shaft 60 in Storaasli, which moves the mechanism 25 along gear rack 30, is not fixedly mounted to the spacecraft; it moves when the apparatus moves. The shaft 60 and any other shaft for the cable 64 are not shown in a colinear arrangement, or any arrangement, with the center of gravity of the mechanism 14. Since the arrangement and teachings of Storassli are not consistent with the claims, Storassli does not teach the limitations of independent claims 1 and 16.

In the Clarke reference, even if the case 10 were attached to a spacecraft, the flexible material 24 is not distributed to adjust the mass properties; it is distributed to keep the motor running and initially used to increase the motor's starting torque. Further, Clarke does not discuss the center of gravity of the motor. Even if Clarke did discuss the center of gravity, Clarke does not show that the first shaft, second shaft, and center of gravity are substantially colinear; the stops 26 and 36 shown in FIGS. 1-3 of clark would bias the center of gravity towards the bottom of these figures, placing the center of gravity in a non-colinear position with the shaft 14 and spindle 22. Since the arrangement and teachings of Clarke are not consistent with the claims, Clarke does not teach the limitations of independent claims 1 and 16.

In the Houston Chronicle reference, the tape in the reel-to-reel tape recorder is not distributed to adjust the mass properties, it is moved from one reel to another to record data generated by the spacecraft science and telemetry subassemblies. Further, the center of mass of the reel-to-reel tape recorder with respect to the spindles for the reels on the recorder is not discussed.

As argued in the previous response, Clarke and Houston Chronicle do not discuss mass properties. The Clarke reference is directed toward a motor having a high starting torque in a specific direction. See Col. 1, lines 28-33. The Houston Chronicle reference discusses data recording on a reel-to-reel tape.

The various elements of Applicants' claimed invention together provide operational advantages over the systems disclosed in the cited references. In addition, Applicants' invention solves problems not recognized by the cited references.

Thus, Applicants submit that independent claims 1 and 16 are allowable over the cited references. Further, dependent claims 2-15 and 17-30 are submitted to be allowable over the cited references in the same manner, because they are dependent on independent claims 1 and 16, respectively, and because they contain all the limitations of the independent claims. In addition, dependent claims 2-15 and 17-30 recite additional novel elements not shown by the cited references.

IV. CONCLUSION

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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